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(56) Documents Cited

EP 1085441 A2

EP 0848322 A1

EP 0843299 A2

EP 0685768 A1

US 5305199 A

US 20010004734 A1

HP Web Jet Admin Ver 6.5 - [HTTP://www.hp.com/](http://www.hp.com/itrc_pdi/products/technotes.html)

itrc_pdi/products/technotes.html

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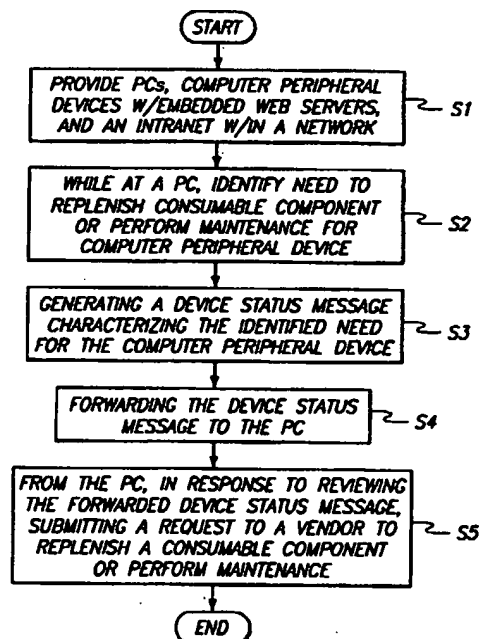
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ONLINE: WPI, EPODOC, JAPIO, Internet

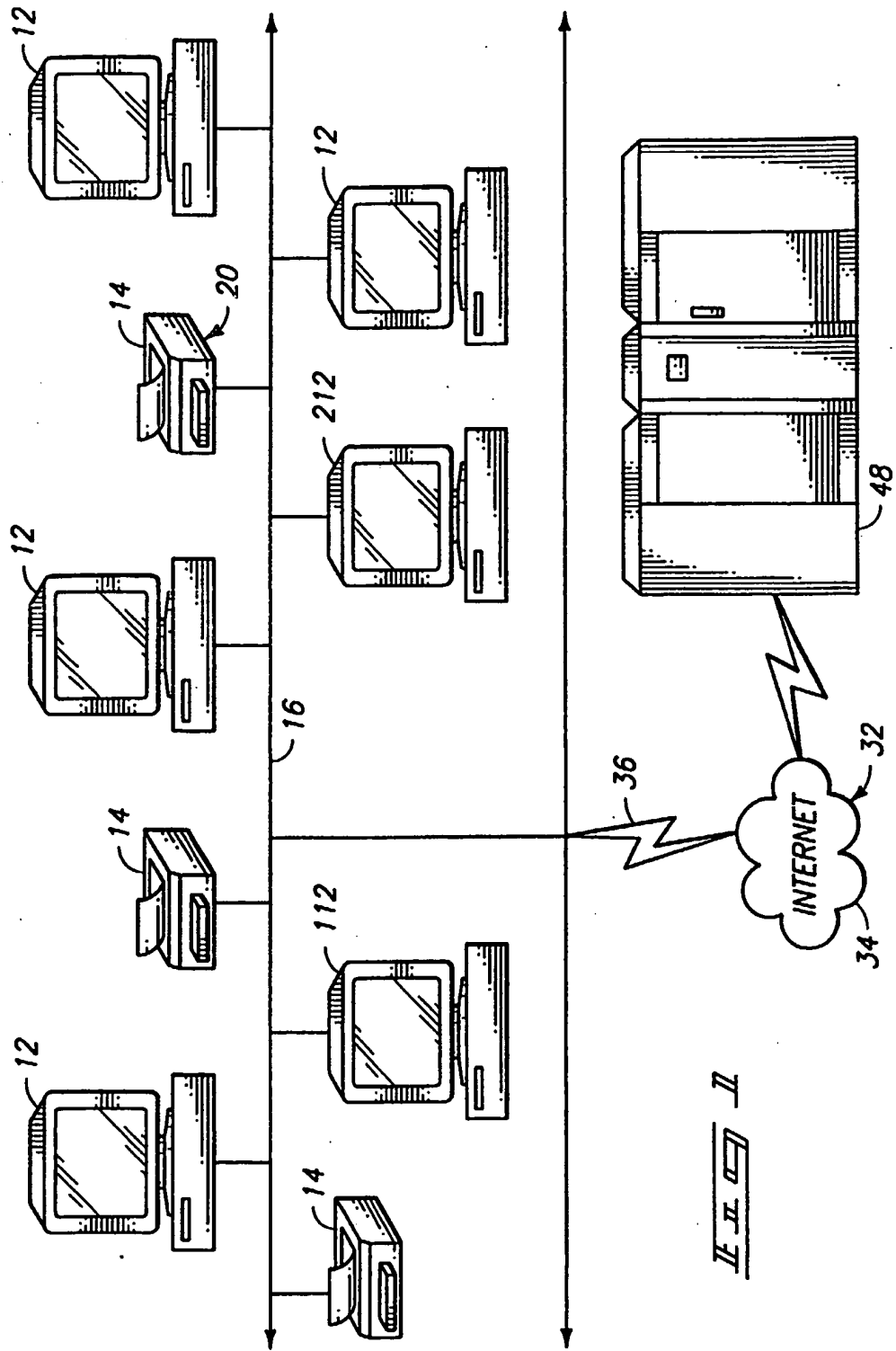
(54) Abstract Title

Automatic system for ordering consumables or requesting maintenance for peripheral equipment

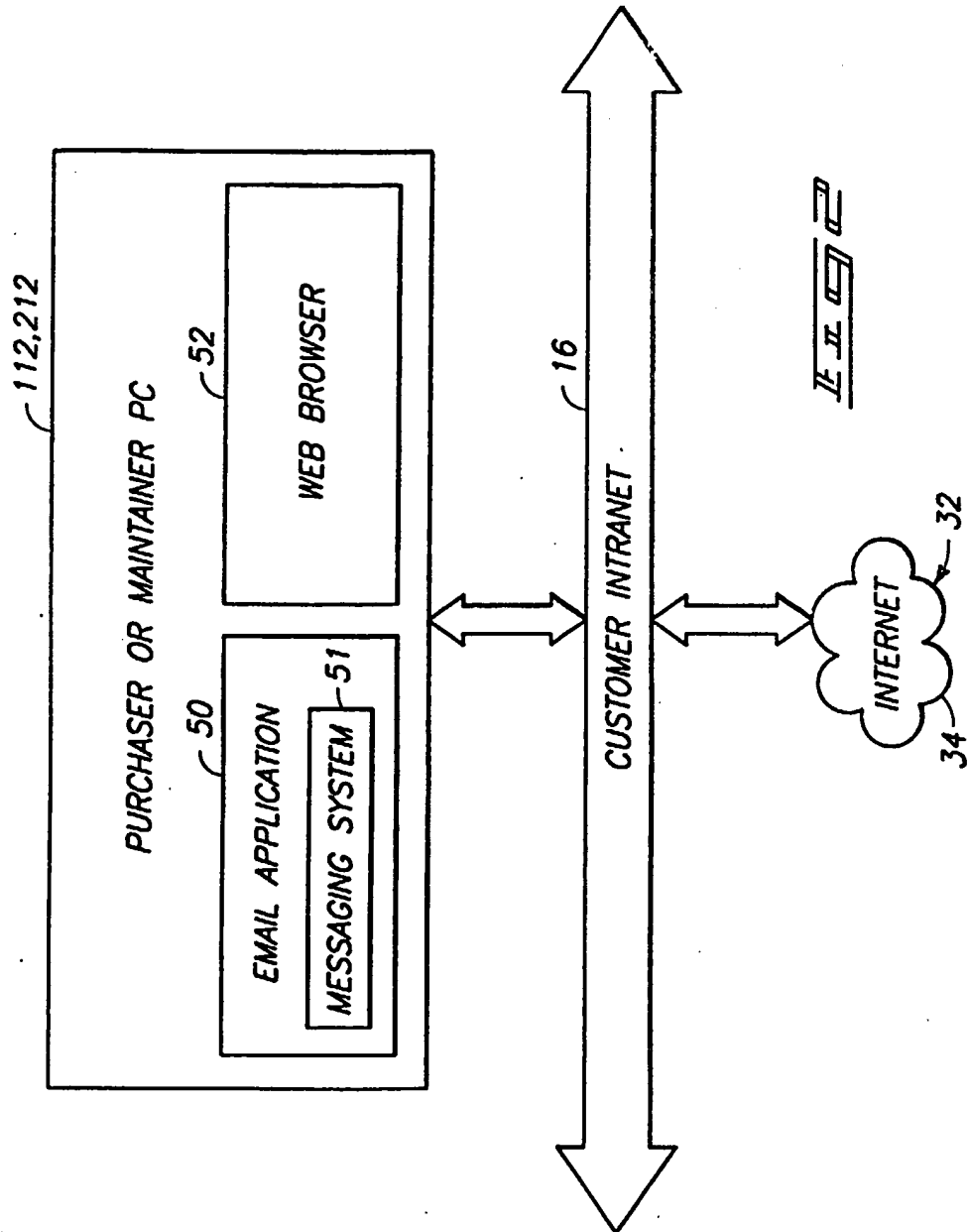
(57) An automatic system of ordering consumables or requesting maintenance for peripheral equipment connected to a network is provided. In use, the peripheral equipment which incorporates an embedded web server generates a device status message. The status message is received by a messaging application on a PC within the network and a web browser is used to submit a request to a provider to supply consumables or perform maintenance. The messaging system may be an E-Mail system. The peripheral may be a printer and use an SNMP structure to describe interactions details with the system.

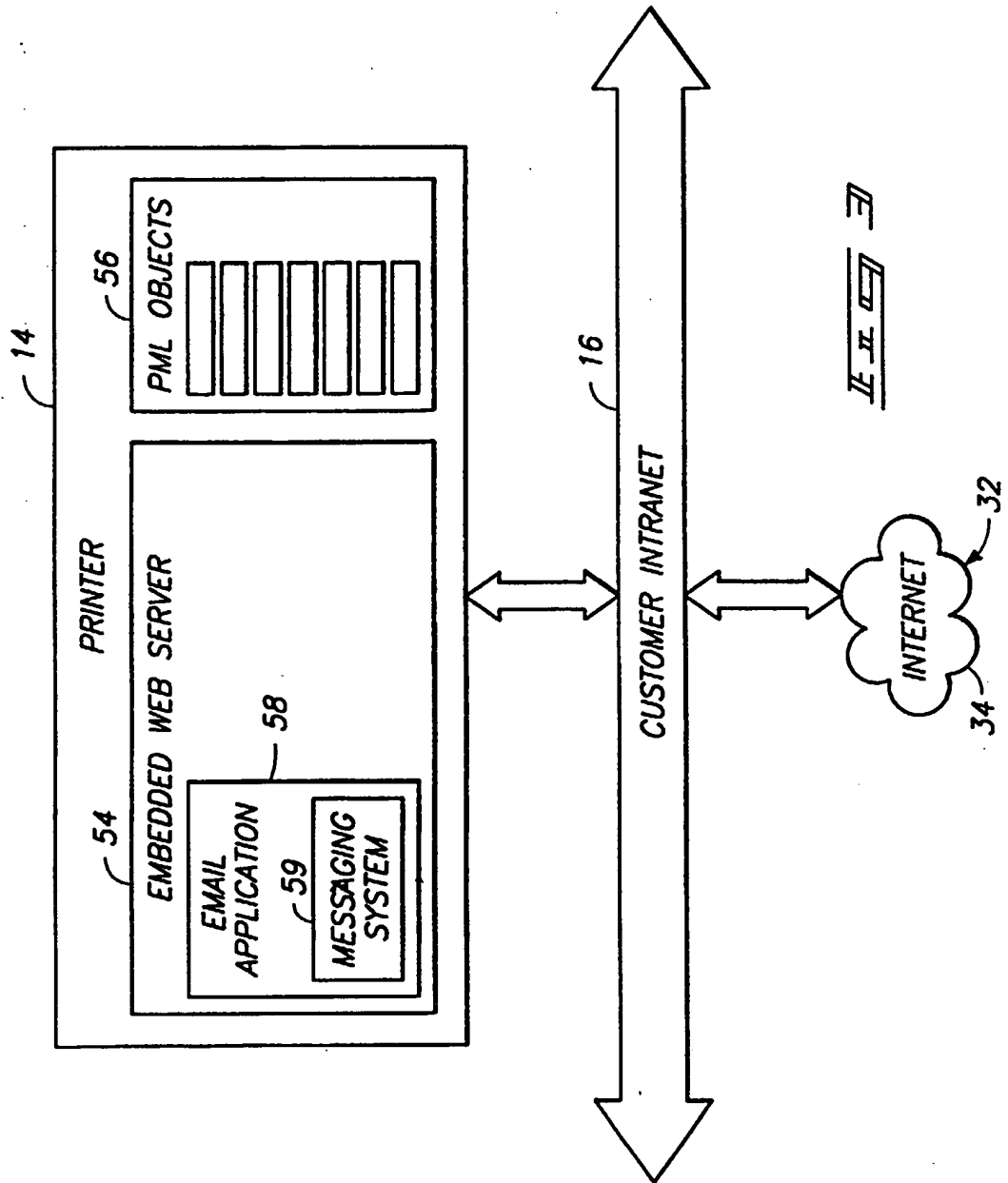


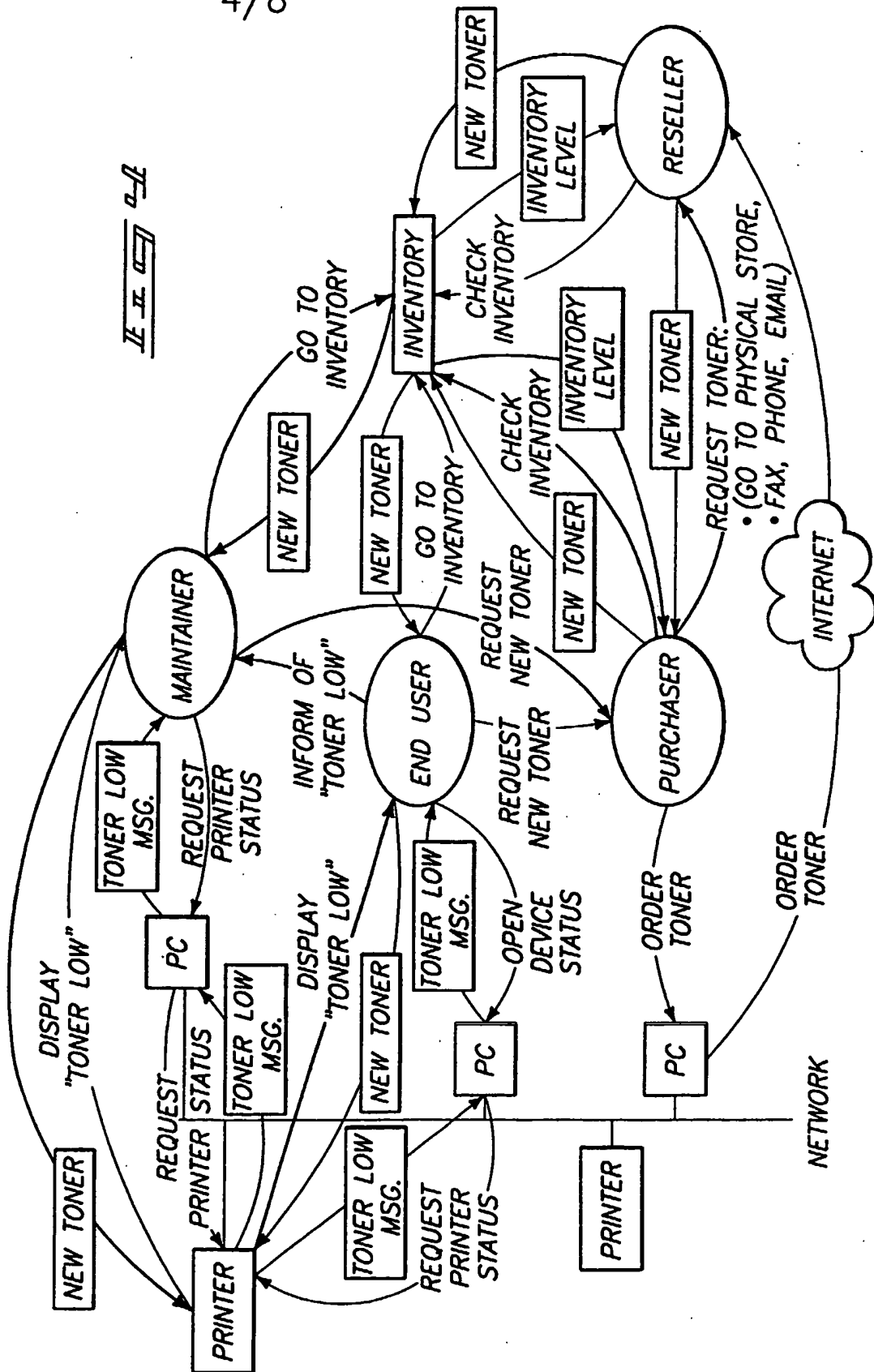
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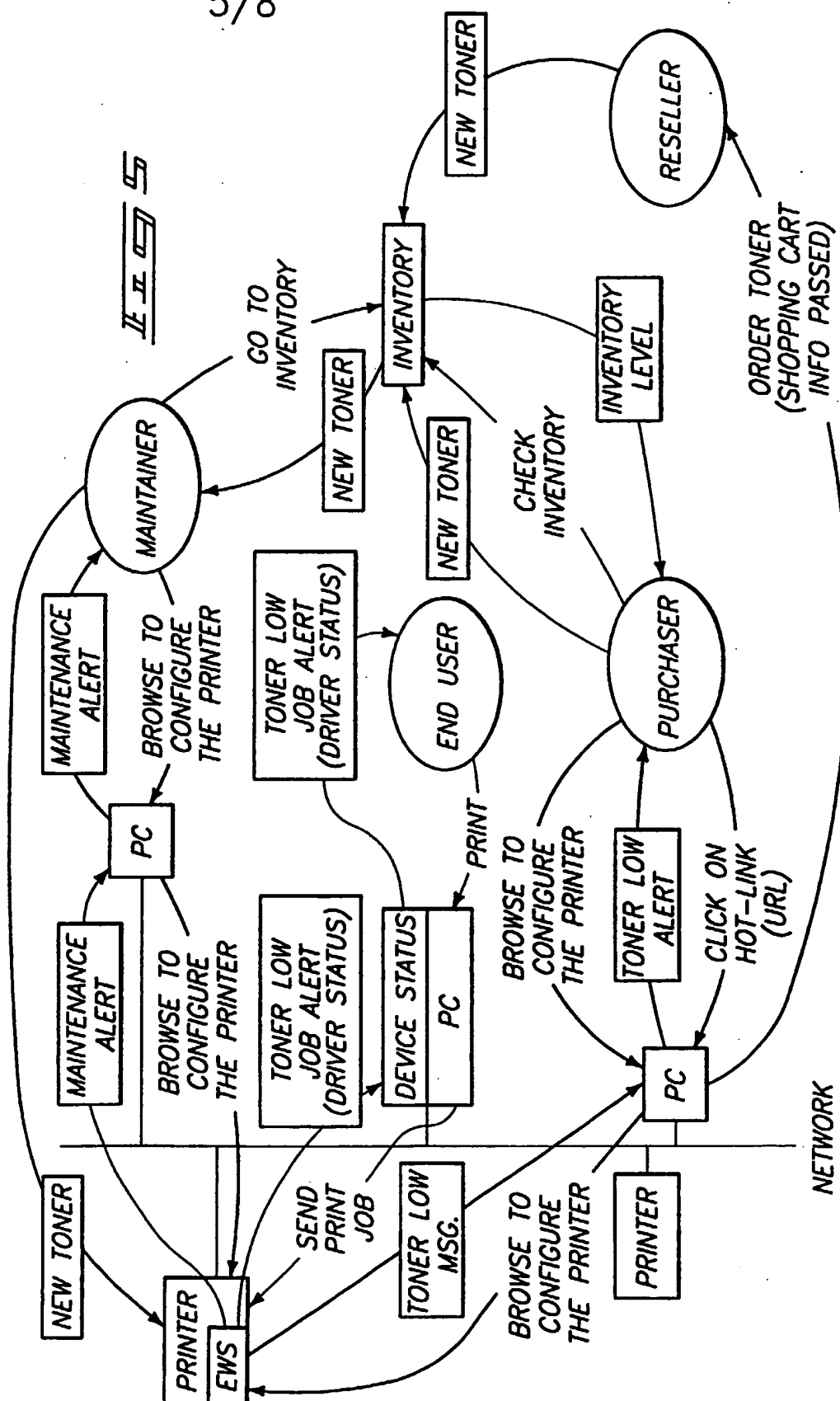


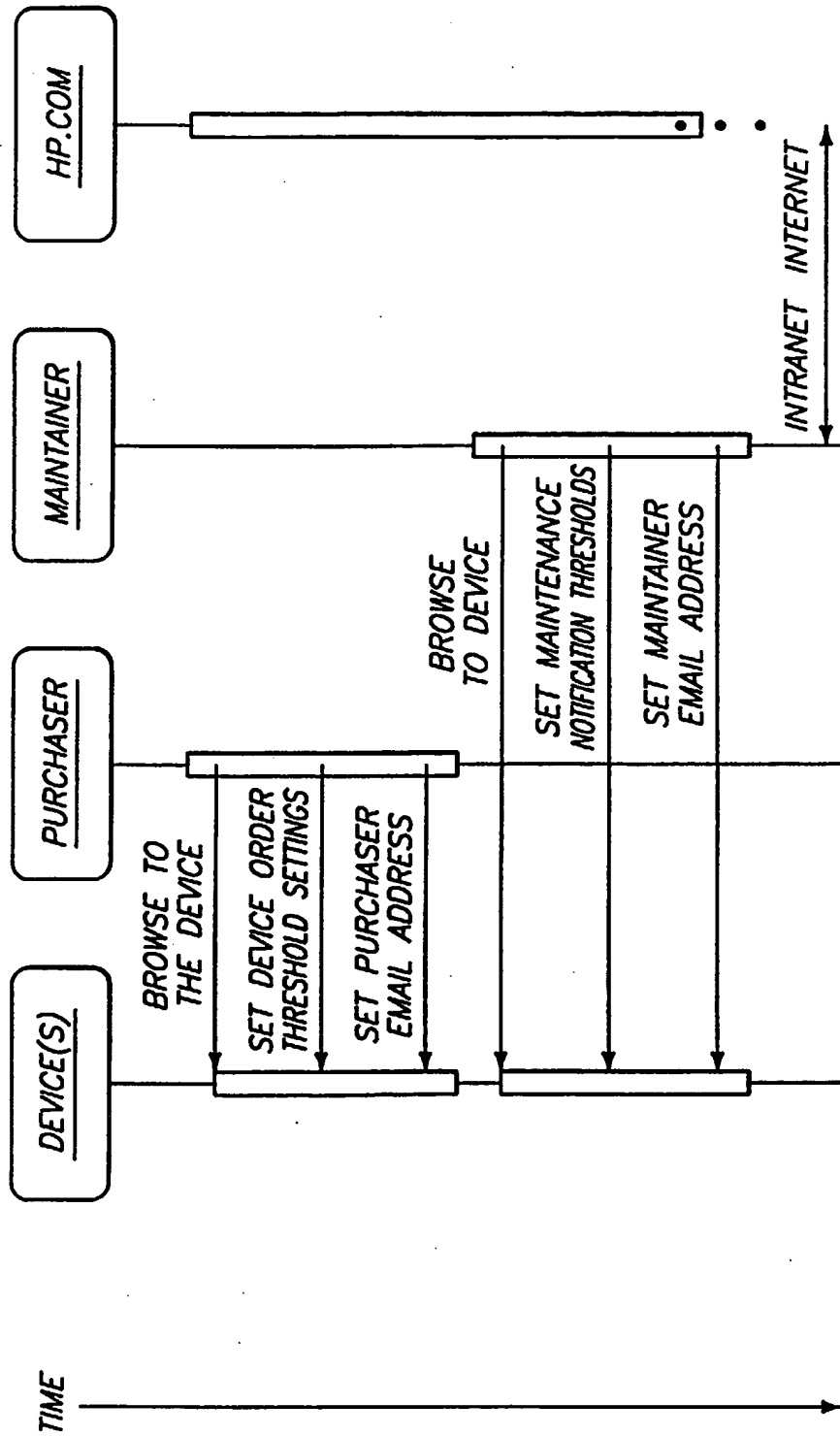
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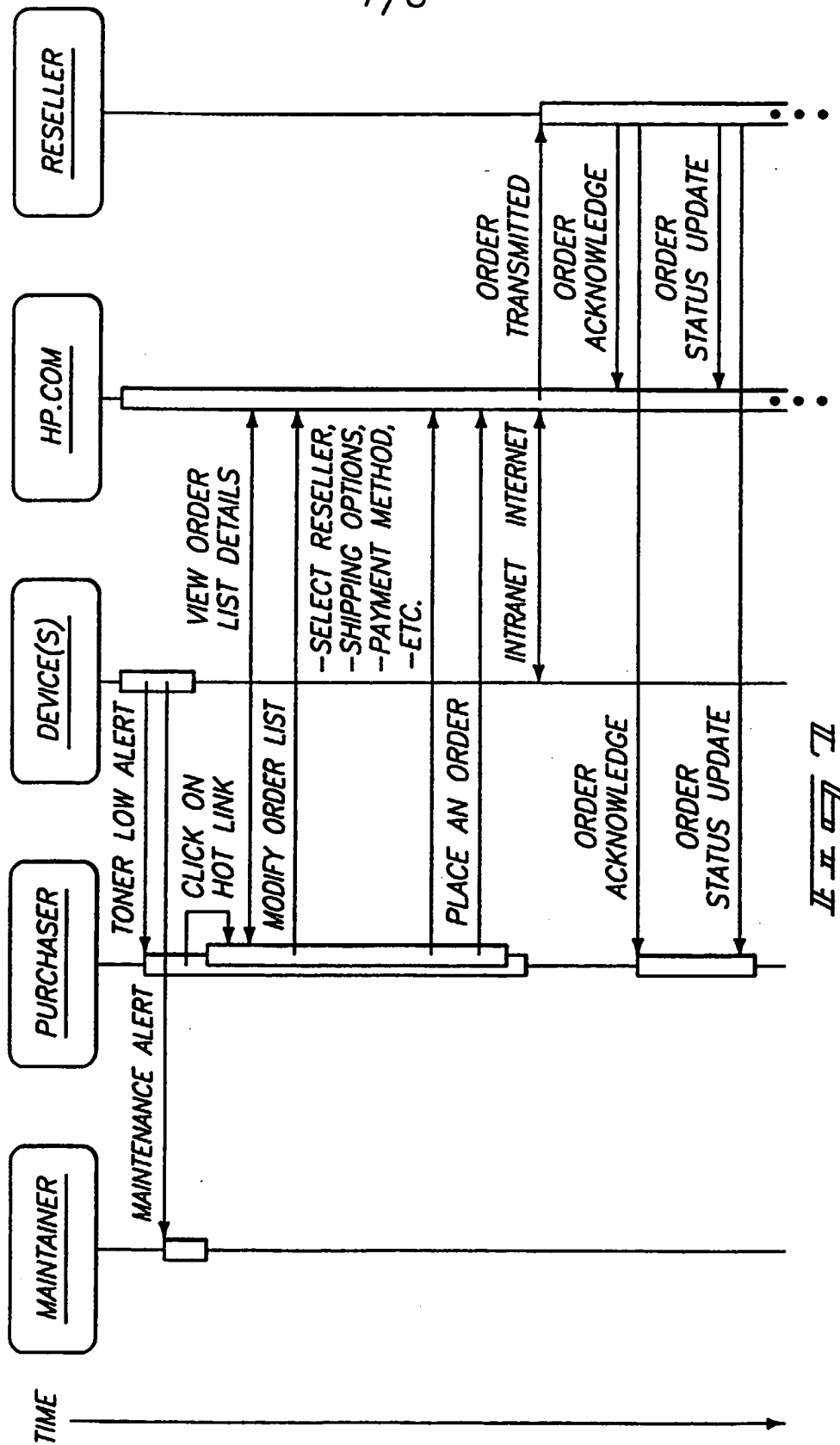


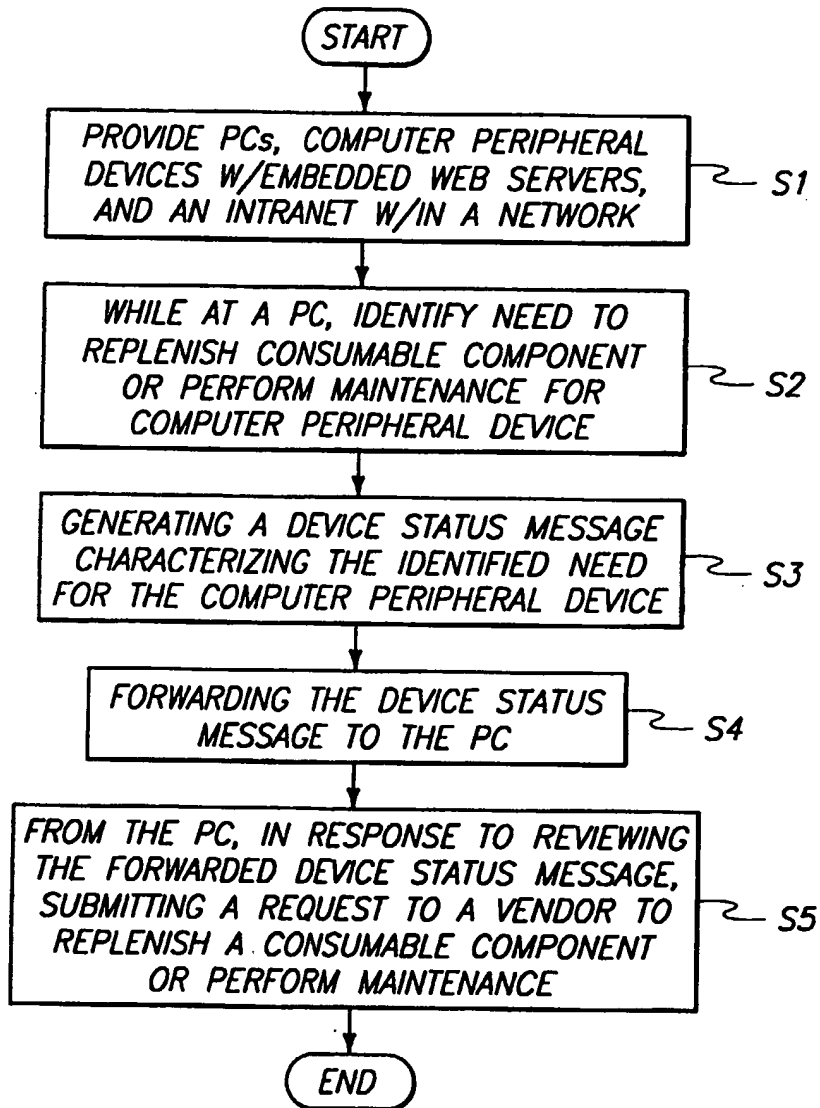






Figure 10





**AUTO-REORDER/ORDER-ASSISTANCE PROCESS AND
INTERACTION FOR AN EMBEDDED WEB SERVER-BASED SYSTEM**

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FIELD OF THE INVENTION

 This invention pertains to computers and computer peripheral
devices that utilize consumables within an unmanaged network. More
15 particularly, this invention relates to the rendering of assistance when ordering
consumables to replenish consumables and/or perform needed maintenance on a
relatively small number of networked computer peripheral devices present within
an unmanaged network environment.

20 **BACKGROUND OF THE INVENTION**

 As computer systems have gained widespread use, particularly
within unmanaged network environments such as in small and medium offices,
the use of computer peripheral devices has increased significantly. Likewise,
the utilization of consumables for such computer peripheral devices has also
25 increased significantly. One problem often encountered with any computer
system results because consumables are manually ordered by a user, a
maintainer, a consumables purchaser or a system administrator. The
consumables are typically ordered when they run out, or when the computer
peripheral device or associated personal computer notifies a user, maintainer,

consumables purchaser, or system administrator that the consumables have been or are about to be depleted.

One such environment comprises a network environment for a small or medium office including one or more personal computers (PCs), one or more computer peripheral devices, and an unmanaged network that connects together the PCs and peripheral devices. Such an environment has been referred to as an unmanaged computer network environment, and may include an intranet or a connection to an external network such as the Internet.

An unmanaged network environment is an environment where a user or customer chooses to not use a centralized management tool within the network, or to use a centralized management strategy for operating and maintaining the network. Accordingly, an unmanaged network environment is managed on a peer-to-peer basis, in contrast with a managed network environment having a centralized management tool.

The ordering of consumables for computer peripheral devices within such small and medium office network environments has been a manual process. For example, consumables are manually ordered by a network user, maintainer or administrator within the network environment for photo copiers, facsimile machines, printers and multiple function peripheral devices that include more than one of these functional devices. Due to the wide adoption of such devices within such small and medium office network environments, a need exists to be able to more easily and accurately order consumables and supplies to replenish depleted consumables. For example, a need exists to assist in ordering of paper, toner, toner supply cartridges, ink, and ink reservoirs.

The ability to enhance ordering of consumables within a network environment, particularly a small or medium office unmanaged network environment, would greatly increase efficiency in ordering multiple, unique consumables and ordering consumables for multiple, unique peripheral devices within a common network. A similar efficiency is realized when servicing parts or performing maintenance. A user tasked with ordering such consumables will save time and effort by enhancing the way in which consumables are identified

and ordered which will minimize the time and effort needed to maintain consumables and keep computer peripheral components functional.

Accordingly, it is desirable to enhance the ease and speed with which consumables are replenished and/or replaced so that adequate supplies of consumables are available for one or more computer peripheral devices when such consumables are sufficiently depleted so as to warrant replenishment.

SUMMARY OF THE INVENTION

A system and method are provided for assisting a user in detecting a need to replenish a consumable and/or perform maintenance or service on a peripheral device. Additionally, the system and method can assist and/or automatically order such consumable for purposes of replenishing the consumable within a network environment.

According to one aspect, a consumable component replenishment and maintenance assistance system is provided for peripherals using an embedded web server-based system within an office network environment. The system includes a computer network, at least one computer peripheral device, and a personal computer. The at least one computer peripheral device is provided within the network and has a consumable component and an embedded web server with an email application operative to generate a device status message. The personal computer is provided within the network and has an email application to receive a device status message from at least one of the computer peripheral devices and a web browser useable to submit a request to a vendor or other provider to replenish a consumable component or perform maintenance.

According to another aspect, a printer monitoring and maintenance system is provided for printers within a network having dedicated computers. The system includes a computer network, a plurality of web-enabled printers, and a plurality of dedicated personal computers. The computer network has an intranet. The plurality of web-enabled printers are provided within the network and have a consumable component. Each printer comprises an email application

operative to generate a device status message. The plurality of dedicated personal computers are provided within the network. Each personal computer has an email application to receive a device status message from at least one of the computer peripheral devices and a web browser useable to submit a request to a vendor or other provider to replenish a consumable component or perform maintenance.

According to yet another aspect, a method is provided for maintaining operation of at least one computer peripheral device within a network environment having dedicated computers. The method includes: providing a plurality of personal computers, computer peripheral devices having embedded web servers, and an intranet within a network; while at one of the computer peripheral devices, identifying a need to replenish a consumable component or perform maintenance for the one computer peripheral device; generating a device status message characterizing the identified need for the one computer peripheral device; forwarding the device status message to the personal computer; and from the personal computer, in response to reviewing the forwarded device status message, submitting a request to a vendor or other provider replenish a consumable component or perform maintenance.

DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention are described below with reference to the following accompanying drawings depicting examples embodying the best mode for practicing the invention.

Fig. 1 is simplified block diagram of a consumable component replenishment and maintenance assistance system for an unmanaged network environment provided by one or more of personal computers (PCs) and one or more computer peripheral devices that are coupled together within a network, and wherein each personal computer has an embedded web server that provides a communication link with an external network such as the Internet, in accordance with one embodiment of the present invention.

Fig. 2 is a simplified block diagram of an exemplary embedded web server (EWS)-based personal computer (PC) associated with a customer intranet and the Internet of Fig. 1.

Fig. 3 is a simplified block diagram of one exemplary web-enabled printer associated with a customer intranet and the Internet of Fig. 1.

Fig. 4 is a flow diagram of an office network having a plurality of personal computers (PCs), and a plurality of printers which are directly connected together through the network to provide a network connection environment, and illustrating interactions by maintainers, users, and one or more purchasers that lead to manual ordering of toner when replenishing toner.

Fig. 5 is a flow diagram of an office network having a plurality of personal computers (PCs), and a plurality of printers which are directly connected together through the network to provide a network connection environment, and illustrating interactions with maintainers, users, and one or more purchasers that lead to consolidated and automated ordering of multiple consumables such as toner and supplies when replenishing a consumable.

Fig. 6 is a sequence diagram illustrating installation and configuration interactions between individuals and devices in Fig. 5.

Fig. 7 is a sequence diagram illustrating notification interactions and order placing interactions between individuals and devices in Fig. 5.

Fig. 8 is a simplified flowchart illustrating a process for replenishing consumables for one or more computer peripheral devices within a network environment such as a small or medium office environment as shown in Figures 1-3 and 5 in accordance with embodiments of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

This disclosure of the invention is submitted in furtherance of the constitutional purposes of the U.S. Patent Laws "to promote the progress of science and useful arts". U.S. Constitution, Article 1, Section 8.

Reference will now be made to a preferred embodiment of Applicant's invention. One exemplary implementation within an unmanaged

network environment such as a small or medium office is described below and depicted with reference to Figures 1-3 and 5. A small or medium office environment with an unmanaged network provides one example. However, it is understood that implementation can occur with any office or other network environment composed of one or more peripheral devices such as printers and PCs, with or without an intranet, and typically lacking a server and a management system, but having some type of Internet or extended intranet connectivity. For example, it may be possible to implement within a home environment, where the home environment is networked and has Internet access with a host 48. Details of the problem encountered with prior art techniques for unmanaged networked offices are described below with reference to the state diagram of Figure 3. While the invention is described by way of a preferred embodiment, it is understood that the description is not intended to limit the invention to these embodiments, but is intended to cover alternatives, equivalents, and modifications such as are included within the scope of the appended claims.

In an effort to prevent obscuring the invention at hand, only details germane to implementing the invention will be described in great detail, with presently understood peripheral details being incorporated by reference, as needed, as being presently understood in the art.

Figure 1 is a simplified block diagram of an unmanaged computer network environment 10 including a plurality of personal computers (PCs) 12, 112, and 212 and a plurality of dedicated computer peripheral devices 14. Each computer peripheral device 14 is signal coupled with each PC 12, 112, and 212 via a network 16. A consumable component replenishment and maintenance assistance system identified by reference numeral 18 is provided within network 16. Network environment 10 provides a network connection between PCs 12, 112, and 212 and peripheral devices 14. According to one construction, computer peripheral device 14 comprises a printer 20, such as a laser printer or an ink jet printer.

As shown in Figure 1, network 16 is signal coupled to an external network 32 comprising the Internet 34, an extended intranet or some other communications path to a consumable provider via a data path 36 that, in the embodiment of Figure 1, includes Internet access.

5 It is also understood that PCs 12, 112, and 212 each includes a central processing unit (CPU), memory, a user interface, and an operating system. However, in order to implement Applicant's invention, PCs 112 and 212 include additional functional components as described below.

Figure 2 illustrates purchaser PC 112 (as well as maintainer PC 10 212) connected with customer network 16 and Internet 34. PCs 112 and 212 are each provided with an email interface via an email application 50 and a web browser 52. Email application 50 comprises a program that enables transmission of memos and messages over a network, and includes a messaging system 51 and a mail program with a user interface having send and receive 15 functions. Web browser 52 comprises a program that serves as a front end to the World Wide Web (WWW) on the Internet.

According to one embodiment, the device driver of PCs 12, 112, and 212 comprises a printer driver. Additionally or optionally, each computer peripheral device 14 comprises a hard copy device such as a copier, a mopier, a 20 facsimile machine, or a multiple function peripheral (MFP) device capable of providing two or more of such functions. Furthermore, it is understood that personal computers 12, 112 and 212 can each include a device driver.

According to one embodiment, PC 12 is signal coupled to an external network 32 comprising the Internet 34 via a data path 36 that includes 25 Internet access. In one embodiment, data path 36 also includes a secure data path using HTTP (hyper text transfer protocol) with SSL (secure sockets layer), as described in more detail in U.S. Patent No. 5,657,390, entitled "Secure Socket Layer Application Program Apparatus And Method", issued to *Elgamal et al.*, and U.S. Patent No. 6,081,900, entitled "Secure Intranet Access", issued to 30 *Subramanian et al.*, wherein such patents are hereby incorporated herein by reference.

Figure 3 illustrates printer 14 connected with customer network 16 and Internet 34. Printer 14 comprises an embedded web server (EWS) 54 and PML objects 56, each comprising an SNMP structure. Embedded web server (EWS) 54 comprises an email application 58 comprising a messaging system 59.

5 The term "PML" refers to Printer Management Protocol, which is an object-oriented request-reply printer management protocol available from Hewlett-Packard Company, of Palo Alto, California. PML comprises a protocol that allows applications to exchange device management information with printers. PML is an object-oriented request-reply protocol which supports a
10 synchronous printer query, control, and monitor capabilities. Details of PML are available at Applicant's developer website,

<http://www.hpdevelopersolutions.com>, which is accessible from Applicant's website, <http://www.hp.com>, by entering a user name, a user selected password, and by joining a solutions provider program including entering a
15 personal profile. More particularly, a PML Protocol Specification, Hewlett-Packard Company, 11/18/98, Revision 2.3 is available therein, and is herein incorporated by reference.

Printer Management Language (PML) protocol is a protocol which permits many applications to exchange device management information with
20 numerous computer peripheral devices, such as image forming devices. PML is an object-oriented request-reply protocol which supports asynchronous printer query, control, and monitor capabilities. Individual computer peripheral devices implement any conversion operations between the protocol used to exchange information with respect to computer peripheral devices (*e.g.*, SNMP) and the
25 internal protocol (*e.g.*, PML) used within the respective computer peripheral devices.

One exemplary remote query language implemented within the network system is a Simple Network Management Protocol (SNMP). In such an exemplary configuration, host devices such as personal computers include
30 respective processing circuitry (not shown) operable to formulate an appropriate SNMP query or request which is addressed to one or more appropriate computer

peripheral devices using a communication medium. The appropriate computer peripheral device(s) receive the query or request and provide information back to appropriate host devices or PCs using the communication medium. Protocols other than SNMP are utilized in other embodiments to implement communications within the system.

PML comprises a Hewlett-Packard version of Institute of Electrical and Electronics Engineers (IEEE) Counsel Standard MIBs. A MIB, or Management Information Base, comprises an SNMP structure that describes the particular device being monitored. More particularly, a MIB comprises a data structure that defines what is obtainable from a device, as well as what can be controlled, such as what can be turned off, on, etc. Accordingly, there exist PML objects that correspond with MIB objects.

SNMP, or Simple Network Management Protocol, comprises a widely-used network monitoring and control protocol. According to the protocol, data is passed from SNMP agents, which are hardware and/or software processes reporting activity in each network device (hub, router, bridge, etc.) to a workstation console that is used to oversee a network. The agents return information contained in a MIB.

Each computer peripheral device 14 includes a print, or printer, engine. The print engine enables the peripheral device to initiate data communication over network 16 with any one of PCs 12, 112, and 212. Likewise, device driver enables PCs 12, 112, and 212 to initiate data communicate with any one of peripheral devices 14 over network 16.

According to one construction, each print or printer engine comprises a controller, such as a conventional microprocessor or microcontroller, and a memory communicating with the controller. In one embodiment, the memory comprises non-volatile memory such as a read only memory (ROM) and a volatile memory such as random access memory (RAM).

Embedded web server (EWS) 54 refers to a web server that is completely contained within a device, such as a computer peripheral device.

Embedded web servers are configured to provide management information about the device, and to provide messaging system functionality.

Also with reference to the flow diagrams in Figures 2-3, the following uniform notation has been utilized to identify "actors", "objects"/"places", "artifacts", "actions", and "work flows". An ellipse is utilized to identify one or more "actors" having a common goal. A shaded rectangular box represents a single "object" or "place". A rectangular box located along flow arrows indicates a physical or conceptual "artifact". Additionally, "actions" are indicated along arrows. Furthermore, thin arrows indicate secondary "work flow", whereas thick arrows indicate primary "work flow".

As shown in Figure 4, a manual process is shown for ordering consumables such as toner for one or more printers located within a medium office network environment. More particularly, the work flow interactions of a user, a maintainer, a purchaser, when they order toner and other supplies are shown in a network environment such as a medium office.

Figure 4 graphically depicts the interactions and needs for a user, a maintainer, a purchaser, and a reseller when manually ordering consumables for each of a plurality of printers in a common network environment pursuant to previously known techniques. More particularly, the interactions are shown between individuals and devices, as well as the information or work flow that transfers between actors and objects/places.

For purposes of this disclosure, a "maintainer" refers to an individual that is dedicated to maintaining operation of printers within a network environment.

From the perspective of a maintainer, there are three possible ways that a "TONER LOW" condition can be delivered to the maintainer when a need to replenish toner is detected at one or more of the printers within an unmanaged office network environment. First, the maintainer can visually detect a "TONER LOW" message that is displayed on a display of a printer. In response, the maintainer takes an action to provide "NEW TONER" to the

printer. The maintainer can "GO TO INVENTORY" in order to retrieve a supply of new, replacement toner indicated by the action "NEW TONER". The resulting new toner is then provided to the printer.

5 Secondly, the maintainer can "REQUEST PRINTER STATUS" at a PC dedicated for use by the maintainer. The "REQUEST PRINTER STATUS" is then made from the PC to the printer. In response, the printer sends a "TONER LOW MESSAGE" to the PC, and from the PC to the maintainer via a user interface of the PC.

10 Thirdly, the maintainer can be informed verbally, or externally of the network, by a user that toner is low, which is indicated by the action "INFORM OF TONER LOW". In response, the maintainer takes an action of "REQUEST NEW TONER" from a purchaser. The purchaser will either "CHECK INVENTORY" with an inventory of toner, after which "INVENTORY LEVEL" information is received from the inventory. If inventory level is sufficiently low
15 to warrant the purchase of new toner, the purchaser takes action to "REQUEST TONER" from a reseller of toner. In response, the purchaser receives "NEW TONER" from the reseller. Subsequently, the purchaser resupplies the purchased "NEW TONER" to the inventory.

20 From the perspective of a user, there are two possible ways that a "TONER LOW" condition can be delivered to the user when a need to replenish toner is detected at one or more of the printers within the medium office network environment. First, the user can visually detect a "TONER LOW" message that is displayed on a display of a printer. In response, the user takes an action to provide "NEW TONER" to the printer. The user can "GO TO
25 INVENTORY" in order to retrieve a supply of new, replacement toner indicated by the action "NEW TONER". Optionally or additionally, the user can "REQUEST NEW TONER" from a purchaser as described below in greater detail.

Secondly, the user can take action to "OPEN DEVICE STATUS" at a PC, and take action to "REQUEST PRINTER STATUS". In response, the
30 printer sends a "TONER LOW MESSAGE" to the user via the PC when the

printer is low (or out) of toner, and it is determined that the toner needs to be replenished.

From the perspective of a purchaser, there are three possible ways that replacement toner can be obtained in order to satisfy a request for new toner. First, the purchaser can take action to "CHECK INVENTORY" from a reseller, as previously discussed. Secondly, the purchaser can take action to "REQUEST TONER" from a reseller, as previously discussed. Thirdly, the purchaser can take action to "ORDER TONER" via a PC through the Internet. According to such option, the PC is used to "ORDER TONER" via the Internet from a reseller.

When the purchaser requests toner from the reseller, the purchaser can request toner by: going to a physical store location; by submitting a facsimile order, by submitting a telephone order with the reseller, or by sending an e-mail order to the reseller.

As shown in Figure 4, a reseller will periodically take action to "check inventory" at the inventory location. For example, the reseller can physically go to the inventor location such as by periodically visiting the inventory location to determine the availability of replacement toner therein. In response to checking the inventory, the reseller is able to determine the "inventory level". When needed, the reseller can take action to provide "new toner" to the inventory location in response to receiving the "inventory level" at a level which requires replenishment.

Figure 5 graphically depicts the interactions and needs for a user, a maintainer, a purchaser, and a reseller when ordering consumables for each of a plurality of printers in an unmanaged small or medium office network environment using the consumable order assistance system of Applicant's invention. More particularly, interactions are shown between individuals and devices, along with the information or work flow that transfers between actors and objects/places.

According to Figure 5, printers 14 of Figure 1 are provided within an unmanaged network environment, such as a small or medium office network

environment. In order to enable automatic reordering of consumables and/or ordering of maintenance and repair, each printer includes an embedded web server (EWS).

5 From the perspective of a user, a user sends a "PRINT" command via a dedicated PC which causes the PC to "SEND A PRINT JOB" to an identified printer via the network. In response, the embedded web server (EWS) of the printer sends a "TONER LOW JOB ALERT" via the PC to the user. More particularly, a "DEVICE STATUS" utility within the PC is notified of the "TONER LOW JOB ALERT", which indicates a printer driver status condition.

10 From the perspective of a maintainer, the embedded web server of a printer in the network sends a maintenance alert to a dedicated PC used by the maintainer via the network. In response to receiving the maintenance alert at the PC, the maintainer uses the PC and network to "BROWSE TO CONFIGURE THE PRINTER". By browsing to the printer, the maintainer can set
15 maintenance notification thresholds for maintenance items on the printer, as will be described below with reference to Figure 6.

The maintainer, in response to receiving a maintenance alert that toner needs replenishment, will "GO TO INVENTORY" to retrieve "NEW TONER".

20 From the perspective of a purchaser, the EWS of the printer sends a "TONER LOW MESSAGE" via the network to the a dedicated PC used by the purchaser when a device order threshold setting has been realized at the printer. The purchaser then receives the "TONER LOW ALERT" from the PC, indicating that toner is low at the specific printer.

25 Additionally, the purchaser uses a dedicated PC to "BROWSE TO CONFIGURE THE PRINTER". By browsing to the printer, the purchaser can set device order threshold settings, as well as set purchaser email addresses. Accordingly, the PC via the network is used with the EWS of the printer to configured the printer.

30 In response to receiving a message that toner is low (e.g. supply is below a threshold in the inventory), the purchaser will "CHECK INVENTORY" to

verify the low supply. Upon verifying the "INVENTORY LEVEL", the purchaser will purchase supplies.

The purchaser will then "CLICK ON HOT-LINK (URL)" to navigate via the dedicated PC using a communication link with the Internet to order supplies from a vendor, supplier, or reseller of the supply. As shown in Figure 5, the purchaser will "ORDER TONER" from a reseller of toner.

More particularly, a purchaser "CLICKS ON HOT-LINK (URL)" via the dedicated PC to a web site (via the Internet) that is configurable to work with an internal customer order system, or an external web site, to order replacement supplies or consumables, such as toner.

One technique entails using a shopping cart to purchase supplies from the reseller over the Internet, wherein shopping cart information is passed between the purchaser and the reseller, according to techniques presently understood and publicly available on the Internet from a number of resellers. In one case the supply is a consumable needing replenishment, such as a toner cartridge. Alternatively, the purchaser can replenish supplies by purchasing supplies at a "bricks and mortar" store, using a telephone, or a facsimile machine.

In response to receiving a toner order, the reseller provides "NEW TONER" to the network. In one case, the toner is mailed to a business address for the network, and one of the maintainer, purchaser or user stocks the new toner into the inventory. Preferably, the maintainer stocks the new supply of toner.

Figure 6 is a sequence diagram showing installation and configuration interactions between individuals and devices in Figure 5. More particularly, following a time line, a purchaser browses to a computer peripheral device, or printer. The purchaser then initiates setting up the system. Alternatively, another user can carry out this step, such as a maintainer, a user, or anyone else that has a need to start the process.

Next, the purchaser remotely sets device order threshold settings with the device. More particularly, the purchaser decides when they want to be

notified that it is time to order supplies or consumables. When can be measured as a percentage of consumable remaining, the amount of time remaining, the number of pages remaining, etc.

Subsequently, the purchaser sets the purchaser email address with the device. More particularly, the purchaser tells the device where to send the notification. Although this task is most likely carried out by the purchaser, it is alternatively possible that another user or even a device could be used to tell the computer peripheral device to send the notification.

A maintainer then browses to the device or printer. More particularly, the maintainer initiates setting the system up to warn that some sort of maintenance needs to take place. In some cases, the purchaser and the maintainer can be the same person. In such as case, this step would not be needed. However, where the purchaser and maintainer are separate people, this step is needed. Furthermore, this step could be carried out by anyone with a need to initiate setting up the system.

The maintainer then sets maintenance notification thresholds with the device. More particularly, the maintainer decides when they want to be notified in order to install a new consumable, such as a toner cartridge (where the device is a printer), some other consumable, or schedule a maintenance item. The thresholds can be based on percentage life remaining for a consumable or component, pages remaining, time remaining, etc. The maintenance notification thresholds do not have to be a separate threshold from the order threshold settings, ordering point. In such case, they could be the same notification. For example, one email is sent to the purchaser to place an order, and a second, same email is sent to the maintainer to fix the problem.

Next, the maintainer sets the maintainer email address with the device. More particularly, the maintainer tells the device where to send the notification. Although this task is most likely carried out by the maintainer, it is alternatively possible that another user or even a device could be used to tell the computer peripheral device to send the notification

Figure 7 is a sequence diagram showing notification and order placement interactions between individuals and devices in Figure 5. More particularly, following a time line, a device (such as a printer) sends a consumable (or toner) order alert email to a purchaser via the network. The purchaser then receives the email, or some other method of notification, that it is now time to order consumables (or toner).

Subsequently, the device may send a maintenance alert if the maintainer has configured the system to warn when a consumable needs replenishment (a cartridge needs replacing), or some other form of maintenance needs to happen. The device may send the email, or other form of notification, at the same time as the order alert, or at a different point in time or level, depending on the configuration.

Next, the purchaser at a dedicated PC clicks on a hot-link, thereby launching a web browser to an ordering site. This process continues until an order has been placed. The hot-link also contains data that indicates what part needs to be ordered. In this manner, an electronic shopping cart can be pre-built when the purchaser gets to the website.

Subsequently, the purchaser can view the order list details, or details of the order, and change the details to different part numbers if the purchaser changes their mind. For example, the purchaser may want to order a different model toner cartridge, maybe to one that has a higher capacity for toner. Additionally, the purchaser can change the details to change quantities. For example, a default setting may be to order a single toner cartridge, and the purchaser may desire to order more than one toner cartridge.

The purchaser can then modify details of an order list. More particularly, the purchaser can select a reseller, if a particular website does not fulfill orders directly, along with shipping options, payment methods, etc. Using the web browser, the purchaser can then place an order with the external website (e.g., www.hp.com).

The website, www.hp.com, then transmits the order to a reseller of the consumable (or toner cartridge). In response, the reseller sends an order

acknowledgment to the website. Additionally, the reseller sends an order acknowledgment to the purchaser. Accordingly, the order acknowledgment could go either to the website, where the purchaser can look it up at any time, or it could go to the purchaser directly. As shown in Figure 7, it could also go to both the website and the purchaser.

Similarly, the order status update(s) could go from the reseller to either the website, the purchaser, or both.

As shown in Figure 7, the order acknowledgment and the order status update are optional. Additionally, it is optional where the notifications go, whether to the website or the purchaser.

Figure 8 forms a process flow diagram showing the logic processing for maintaining operation of at least one computer peripheral device within a network environment having dedicated computers. More particularly, Figure 8 illustrates logic processing used to replenish consumable components and/or perform maintenance.

In Step "S1", a plurality of personal computers, and computer peripheral devices having embedded web servers are provided within a network. After performing Step "S1", the process proceeds to Step "S2".

In Step "S2", the process, while at one of the computer peripheral devices, identifies a need to replenish a consumable component or perform maintenance for the one computer peripheral device. After performing Step "S2", the process proceeds to Step "S3".

In Step "S3", the process generates a device status message characterizing the identified need for the one computer peripheral device. After performing Step "S3", the process proceeds to Step "S4".

In Step "S4", the process forwards the device status message to the personal computer. After performing Step "S4", the process proceeds to Step "S5".

In Step "S5", the process, from the personal computer, in response to reviewing the forwarded device status message, submits a request

to a vendor to replenish a consumable component or perform maintenance.
After performing Step "S5", the process proceeds to Step "S2", or terminates.

In compliance with the statute, the invention has been described in language more or less specific as to structural and methodical features. It is to be understood, however, that the invention is not limited to the specific features shown and described, since the means herein disclosed comprise preferred forms of putting the invention into effect. The invention is, therefore, claimed in any of its forms or modifications within the proper scope of the appended claims appropriately interpreted in accordance with the doctrine of equivalents.

CLAIMS

What is claimed is:

- 1 1. A consumable component replenishment and maintenance
2 assistance system (18) for peripherals using an embedded web server-based system
3 (54) within a network environment (10), comprising:
4 a computer network (16);
5 at least one computer peripheral device (14) within the network (16)
6 having a consumable component and an embedded web server (54) with a
7 messaging system (59) application operative to generate a device status message;
8 and
9 a personal computer (12) within the network (16) and having a
10 messaging system (51) application to receive a device status message from at least
11 one of the computer peripheral devices (14) and a web browser (52) useable to
12 submit a request to a provider to replenish a consumable component or perform
13 maintenance.
- 1 2. The system of claim 1 wherein the messaging system (51, 59)
2 application comprises an email application (50, 58).
- 1 3. The system of claim 1 wherein the web browser (52)
2 cooperates with a communication link (36) to submit an order for a consumable
3 with a provider of the consumable.
- 1 4. The system of claim 1 wherein the web browser (52)
2 cooperates with a communication link (36) to submit a maintenance order with a
3 service provider for the computer peripheral device (14).
- 1 5. The system of claim 1 wherein the printer (20) further
2 comprises an SNMP structure that describes interaction details and control of the
3 printer (20).

1 6. The system of claim 1 wherein the computer peripheral device
2 (14) generates a device status message comprising a consumable alert indicating
3 that a consumable is low or out.

1 7. The system of claim 1 wherein the computer peripheral device
2 (14) generates a device status message comprising a maintenance alert indicating a
3 need to perform maintenance on the computer peripheral device (14).

1 8. A method for maintaining operation of at least one computer
2 peripheral device (14) within a network environment (10) having dedicated
3 computers, comprising:
4 networking a plurality of personal computers (12) and computer
5 peripheral devices (14) having embedded web servers (54);
6 while at one of the computer peripheral devices (14), identifying a
7 need to replenish a consumable component or perform maintenance for the one
8 computer peripheral device (14);
9 generating a device status message characterizing the identified need
10 for the one computer peripheral device (14);
11 forwarding the device status message to the personal computer (12);
12 and
13 from the personal computer (12), in response to reviewing the
14 forwarded device status message, submitting a request to a provider to replenish a
15 consumable component or perform maintenance.

1 9. The method of claim 21 wherein one of the personal computers
2 (12) is a maintainer computer, and another of the personal computers (12) is a
3 purchaser computer.

1 10. The method of claim 21 wherein one of the computer peripheral
devices (14) comprises a printer (20) having an embedded web server (54).



INVESTOR IN PEOPLE

Application No: GB 0126801.0
Claims searched: 1-10

Examiner: Nigel Hanley
Date of search: 10th May 2002

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK Cl (Ed.T): G4A (AFMD, AFMG, AUXF)
Int Cl (Ed.7): G06F 3/12, 11/30, 17/60
Other: ONLINE: WPI, EPODOC, JAPIO, Internet

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X,P	EP 1085441 A2	XEROX(HAYWARD) - See whole document. Note facility for converting a peripheral status message into an order for a part.	1, 8 at least
X	EP 0848322 A1	CANON(WAKAI) - See whole document especially abstract and second embodiment. Note the sending of an E-Mail in response a peripheral status message.	1, 8 at least
X	EP 0843229 A2	CANON(KODIMER) - See whole document. Note especially the provision for a peripheral to with an SNMP agent and HTTP Server (Column 8 Lines 36-48). Note also the facility to generate a service request over the web in response to a detected condition (Column 15 Line 35-43).	1, 8 at least
X	EP 0685768 A1	XEROX(KNODT) - See whole document especially Column 6 Line 34-53 and Figure 8. Note automatic reorder of supplies in response to a status message from the peripheral.	1, 8 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	B	Patent document published on or after, but with priority date earlier than, the filing date of this application.



INVESTOR IN PEOPLE

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Category	Identity of document and relevant passage		Relevant to claims
X,P	US 20010004734 A1	IBM - See whole document especially Figs 9, 10 & 11, Para 0039-0053 & Para 0125- 0129. Note the printer sensing a need for consumable supplies and creating an order from memory which is e-mailed to the supplier or an administrator for approval.	1, 8 at least
X	US 5305199 A	XEROX(LoBIONDO) - See whole document. Note the inventory monitoring system on a reprographic machine which includes an automatic ordering system for consumables.	1, 8 at least
X,P	HP Web Jet Admin Ver 6.5 - Download Available 17-9-01 http://www.hp.com/itrc_pdi/products/technotes.html <i>Note the use of an embedded web server to provide an E-Mail service which can be operated in response to a printer status. Note also specific feature of sending an email to the purchaser responsible for ordering Toner as part of an alert process.</i>		1, 8 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.